

WHAT IS CLAIMED IS:

1. A method of forming a PE-TEOS layer of a semiconductor integrated circuit device, said method comprising:

providing a plurality of wafers to be batch-processed using a loading wafer cassette containing the wafers;

pre-creating a process atmosphere in a chamber, the atmosphere being the same as one in which PE-TEOS will be formed on the wafers;

subsequently supplying the plurality of wafers in sequence from the loading wafer cassette and onto a table comprising a heater in the chamber;

forming a PE-TEOS layer on the plurality of wafers, said forming comprising spraying a process gas, including TEOS, into the chamber through showerheads and onto the wafers disposed on the heating table, and exciting the process gas using RF power;

discharging the plurality of wafers from the chamber;

cleaning the inside of the chamber once all of the wafers in the chamber have been discharged from the chamber; and

after the chamber has been cleaned, and before any more wafers are loaded into the chamber, supplying TEOS gas into the chamber through the showerheads without exciting the TEOS gas with RF power so as to reduce the temperature of the showerheads and that prevailing inside the chamber.

2. The method of claim 1, wherein the pre-creating of the process atmosphere includes heating the table to a temperature of about 350°C, spraying TEOS gas through the showerheads, and forming plasma in the chamber by exciting the process gas using RF power of about 300W to 700W while the process gas is at a pressure of about 2 Torr.
3. The method of claim 2, wherein the cleaning of the inside of the chamber is performed by supplying oxygen gas and C<sub>2</sub>F<sub>6</sub> gas together into the chamber, and exciting the oxygen gas and C<sub>2</sub>F<sub>6</sub> gas with the RF power while at a pressure of about 3 Torr and a temperature of about 390°C.
4. The method of claim 1, wherein the supplying of the TEOS gas is performed by spraying about 1μl to 20kl of the TEOS gas into the chamber for one second to two hours, and maintaining the pressure of the TEOS gas once it is in the chamber at about 20 Torr or less.
5. The method of claim 4, wherein the supplying of the TEOS gas is performed by spraying the TEOS gas at a flow rate of about 2.1ml/min for about 250 seconds, and maintaining the pressure of the TEOS gas once it is in the chamber at about 2 Torr.

6. A plasma-enhanced method of processing each of a plurality of substrates, said method comprising:

pre-creating a process atmosphere in a processing chamber of a plasma processing apparatus, the atmosphere being the same as one in which the substrates will be processed;

subsequently supplying the substrates in sequence into the chamber;

processing a batch of the substrates, said processing comprising spraying a process gas into the chamber and towards substrates disposed in the chamber, and exciting the process gas using RF power to convert the process gas into plasma, whereby the plasma is deposited on the substrates and a portion of the plasma processing apparatus within said chamber;

discharging the batch of substrates from the chamber;

cleaning the inside of the chamber once all of the wafers in the chamber have been unloaded from the chamber to remove deposits from said portion of the plasma processing apparatus, said cleaning comprising heating the chamber; and

after the chamber has been cleaned, and before any more substrates are loaded into the chamber, supplying a gas into the chamber without exciting the gas with RF power so as to reduce the temperature prevailing inside the chamber.

7. The method of claim 6, wherein said spraying a process gas into the

chamber and onto the substrates disposed in the chamber comprises spraying the process gas through a shower head, and said supplying a gas into the chamber comprises spraying gas into the chamber through said showerhead.

8. The method of claim 6, wherein the process gas comprises TEOS gas.
9. The method of claim 8, wherein the gas supplied into the process chamber is also TEOS gas.
10. The method of claim 6, wherein the cleaning of the inside of the chamber is performed by supplying a cleaning gas into the chamber, and exciting the cleaning gas using RF power to convert the cleaning gas to plasma.
11. The method of claim 10, wherein the cleaning gas comprises oxygen gas and  $C_2F_6$  gas.
12. The method of claim 8, wherein the cleaning of the inside of the chamber is performed by supplying a cleaning gas into the chamber, and exciting the cleaning gas using RF power to convert the cleaning gas to plasma.

13. The method of claim 10, wherein the cleaning gas comprises oxygen gas and  $C_2F_6$  gas.

14. The method of claim 6, and further comprising subsequently processing another batch of substrates in the chamber.